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ABSTRACT

Computer Assisted Individualized Study Package (CAISP) is a set of computer programs in BASIC intended to help teachers administer individualized study courses. It is intended for use with computers that allow direct user interaction during program execution, and is written on the DEC 10 time shared computer. This report focuses on how to use these programs and suggests potential applications. Listings of a sample unit and a sample run are provided. (DAG)

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Number 11

The Illinois Series on

Educational Applications of Computers

CAISP (Computer Assisted Individualized Study Package)

Computer Managed Instruction in BASIC

Mark W. Pelczarski

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November 1976

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Preface

This is the first of what we hope will be a series of ISEAC reports on Computer Managed Instruction (CMI). This paper describes CAISP (Computer Assisted Individualized Study Package), a set of BASIC programs for CMI developed in the Department of Secondary Education.

Because of length, a second paper will contain program listings, documentation, and expectations for the future of CAISP. Possibilities for future related papers include detailing other CMI systems available and the implementation of CMI in the classroom.*

We would greatly appreciate input from sources in the schools concerning any of these areas or the CAISP program itself. CAISP is less than a year old and still has room for development (especially since the program is currently in DEC-BASIC and will soon be rewritten on an HP2000 and a CDC CYBER). The philosophy of ISEAC is one of interaction among the people involved, and we encourage you to give us your views.

Concerning CAISP, CMI in general, or interest in the HP version of CAISP, please contact Mark Pelczarski, Sycamore High School, Spartan Trail, Sycamore, Illinois 60178. Concerning directions you feel we should explore or ISEAC projects you would like to see or direct, please contact Bruce Hicks, Department of Secondary Education, University of Illinois, Urbana, Illinois 61801.

*The author's MS thesis will be based upon ISEAC Nos. 11 and 12.

ISEAC Number 11

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CAISP - Computer Managed Instruction in BASIC

Mark W. Pelczarski

I. What is CAISP?

CAISP--Computer Assisted Individualized Study Package--is a set of computer programs intended to help teachers administer individualized study courses. It was originally designed to allow teachers to put quiz material on the computer for student paced use, with immediate feedback and appropriate assignments given to the students dependent upon their performance. Records are kept of each student encounter with the computer. The versatility of the completed set of programs, however, lends it to use in other areas of CAI (Computer Assisted Instruction), such as lesson programs, drill and practice, evaluation of student learning or reactions to other CAI programs, and information dissemination.

In the beginning, CAISP evolved from ideas in other existing CMI (Computer Managed Instruction) programs. CAISP is intended for use with computers that allow direct user interaction during program execution, and was written on a Dec System 10 time shared computer. CAISP's predecessor at the University of Illinois, BASMS (BASIC Study Management System), was written on a similar computer. BASMS, in turn, was inspired by CAISMS (Computer Assisted Instruction Study Management System), which was written on the University of Illinois' PLATO system. Other programs referenced in the earlier development of CAISP were IDF (Instructional Dialogue Facility), which is Hewlett-Packard's CMI set, Theodore Martz' CMI programs for interactive BASIC developed at the University of Wyoming, and TAIM (Teacher-Authored Instruction Manager), a batch computer CMI system developed at the University of Alberta (see references at end of paper).

After the first working version of CAISP was written, development centered mainly around user evaluations and suggestions, although ideas from other CMI systems were still being implemented in the programs. Evaluation was primarily from the teacher's standpoint and came from teachers and teacher trainees at the University.

CAISP was written with the following four objectives in mind:

1) The programs that implement CAISP should be small enough to use on a small computer. (The longest program is less than 2,176 36 bit words on the DEC 10.)

2) The programs should be as versatile as possible.

3) The programs should be easy to understand and to use for a teacher with no computer experience.

4) The programs should be easy to transcribe from one system to another.

II. The Programs - How to Use Them

This portion of the paper is an instruction set for CAISP interspersed with sample computer output from the CAISP programs. It is suggested that the reader read just the instructions for each part at first, skipping the computer output unless clarification is needed. Then, after getting an overall view of the programs, he may wish to inspect the output more carefully.

The user-typed portions in the computer output are underlined.

2.1 Introduction - The Three Programs, Courses, Units

CAISP stands for Computer Assisted Individualized Study Package. It is a set of 3 computer programs (plus a Director's Program) that allows teachers to write quiz material, have their students go through the material at their own pace via computer, and have the students' results stored for output and analysis at the teacher's convenience.

If a teacher decides to use CAISP for a course, he creates a 'course' on CAISP. This 'course' is divided into 'units', which contain the actual student materials. The teacher also gives a list of students for the course, each with his own password. The teacher has a special password for the course, allowing him to edit the units and see the records.

Example: A sample course named 'METRIC' was created with CAISP. Units included 'INTR', an introduction, 'ARITH', an arithmetic quiz, 'LENGTH', 'VOLUME', 'WEIGHT', and 'TEMPER'. The teacher's password was CONVERT. For demonstration purposes, the students had as names the letters of the alphabet A-Z, with student passwords the same as the name.

The Teacher/Unit Program allows the teacher to write and edit units. To run this program, the teacher must have the course name and teacher's password.

The Student Program allows the student to go through one of the units. The student must have a valid student name, the course name, his password, and the name of the unit he wants to run.

The Records Program allows the teacher to see student records for the units they have used, or to see unit summaries. Course name and teacher's password are required to run this program.

2.2 Units, Segments

Units consist of a set of instructions to the computer telling it what to do when the student program is run. The instructions are called 'segments', and there are seven general types: text, questions, replacement question, right/wrong answer messages, labels, branches, and chains. When you are writing a unit the computer always lists the choices, so there is no need to memorize each kind of segment.

Computer Output: Some segments (The numbers and segment names are inserted by the computer. These do not have to be typed by the user.)

```
1 )  TEXT

     THIS IS A DRILL AND PRACTICE UNIT FOR THE METRIC COURSE.
     THE QUESTIONS HERE ARE SIMILAR TO THOSE ON THE TEST:  MTEST.
```

```
2 )  TEXT

  RECORDS WON'T BE KEPT FOR THIS UNIT SO YOU MAY USE
  IT AS OFTEN AS YOU LIKE.

3 )  QUESTION                          **** QUESTION 1 ****

  7623.0 DG = ? HG

4 )  ACCEPTABLE ANSWERS:

  7.623
  7.623  HG
```

Computer Output: When writing a unit, the computer gives the choices.

```
AT THIS LOCATION, DO YOU WANT TO ADD:  (1) LABEL, (2) TEXT,
   (3) QUESTION, (4) REPLACEMENT QUESTION, (5) BRANCH,
   (6) RIGHT/WRONG ANSWER MESSAGE, (7) CHAIN, OR (8) NOTHING.
```

2.3 Text

The text segment, when executed in the Student Program, prints a set of text that the teacher had specified after choosing the text segment while writing the unit.

Text may be anything from a heading to several paragraphs. Text may occur anywhere throughout the unit.

Computer Output: Inputting text

```
AT THIS LOCATION, DO YOU WANT TO ADD:  (1) LABEL, (2) TEXT,
   (3) QUESTION, (4) REPLACEMENT QUESTION, (5) BRANCH,
   (6) RIGHT/WRONG ANSWER MESSAGE, (7) CHAIN, OR (8) NOTHING.

?2
TYPE IN TEXT
WHEN FINISHED TYPE A LINE 'XXX'
 ?RECORDS WON'T BE KEPT FOR THIS UNIT SO YOU MAY USE IT AS OFTEN
 ?AS YOU LIKE.
 ?XXX
AT THIS LOCATION, DO YOU WANT TO ADD:  (1) LABEL, (2) TEXT,
```

Computer Output: How it shows up when the teacher lists the unit

```
3 )  TEXT

  RECORDS WON'T BE KEPT FOR THIS UNIT SO YOU MAY USE IT AS OFTEN
  AS YOU LIKE.
```

Computer Output: What the student sees

```
  RECORDS WON'T BE KEPT FOR THIS UNIT SO YOU MAY USE IT AS OFTEN
  AS YOU LIKE.
```

2.4 Questions

The question segment allows the teacher to type in a question and generate an answer segment that contains all answers that are acceptable. If the answer requires a word, the teacher can list any misspellings of the word that he will also accept. If the answer is a number, the teacher may wish to list several forms of that number. The teacher is also given the option of inserting right and wrong answer messages at this time. (These are explained later in the instructions.)

When the Student Program encounters a question, it will print the text of the question, wait for a student response, then compare that response with the answers in the answer list. The response must match one of the answers in the list exactly to be considered correct. If right/wrong answer messages are included, the computer gives the appropriate message.

Three records are kept for each question: whether it has been taken,* whether it was taken more than once, and whether it has been correct.

Computer Output: Inputting a question

```
AT THIS LOCATION, DO YOU WANT TO ADD:  (1) LABEL, (2) TEXT,
   (3) QUESTION, (4) REPLACEMENT QUESTION, (5) BRANCH,
   (6) RIGHT/WRONG ANSWER MESSAGE, (7) CHAIN, OR (8) NOTHING.

?3
TYPE IN QUESTION
WHEN FINISHED TYPE A LINE 'XXX'
?.      56
?.     -48
?.      --
?XXX
TYPE IN THE ANSWERS YOU WILL ACCEPT, ONE PER LINE
WHEN FINISHED TYPE A LINE 'XXX'
 ?8
 ?8.0
 ?XXX
DO YOU WANT A RIGHT ANSWER MESSAGE ('YES' OR 'NO')      ?N
DO YOU WANT A WRONG ANSWER MESSAGE ('YES' OR 'NO')      ?N
AT THIS LOCATION, DO YOU WANT TO ADD:  (1) LABEL, (2) TEXT,
```

Computer Output: How it shows up when the teacher lists the unit.

```
17 )  Question                  **** QUESTION  4  ****

   .  56
   . -48
   .  --

18 )  ACCEPTABLE ANSWERS:

  8
  8.0
```

*The word "taken" which is used often regarding questions in the CAISP program, implies that a student has seen and answered the question referred to.

Computer Output: What the student sees

```
PRESS   RETURN  ?

.        56
.       -48
.        --
?
```

2.5 Replacement Questions

Since individualized study programs, and CAISP, are based upon mastery learning, there is a special treatment of questions when the student goes through a unit more than once. If a student has taken a question already and gotten it correct, it is automatically scored correct thereafter. The student does not see the question again. If the student has taken a question and gotten it wrong, before that question is given again the computer checks if there is a replacement question immediately following that question; if there is, the computer gives the replacement, if not, the question is given over. There can be any number of replacement questions after a given question, so if a student gets the replacement wrong, the next time he is given the second replacement, and so on. When the list of replacements for a particular question runs out, the computer goes back to the top of the list and the original question again.

Replacement questions are input just as questions are. The records for replacement questions are actually counted as questions, so if each question has one replacement, the questions will be numbered 1,3,5,7,... in the records, and the replacements will be numbered 2,4,6,8,....

Computer Output: The only difference between questions and replacement questions in output is that headings for replacement questions in the teacher's unit lisitng say 'REPLACEMENT QUESTION'

2.6 Right/Wrong Answer Messages

Right and wrong answer messages are inserted immediately after the answer list for a question or replacement question. They are optional, but if either or both are included they serve as immediate responses to the student in the appropriate circumstances. They are input similarly to text material, and may be added when editing the unit rather than when the question is input. No question may have more than one of either type of message.

Computer Output: Right and Wrong Answer messages input with a question

```
TYPE IN QUESTION
WHEN FINISHED TYPE A LINE'XXX'
 ?7623.0 DG = ? HG
 ?XXX
TYPE IN THE ANSWERS YOU WILL ACCEPT, ONE PER LINE
WHEN FINISHED TYPE A LINE 'XXX'
 ?7.623
 ?7.623 HG
 ?XXX
DO YOU WANT A RIGHT ANSWER MESSAGE ('YES' OR 'NO')        ?Y
TYPE IN MESSAGE
WHEN FINISHED TYPE A LINE 'XXX'
 ?RIGHT.
 ?XXX
DO YOU WANT A WRONG ANSWER MESSAGE ('YES' OR 'NO')        ?Y
TYPE IN MESSAGE
WHEN FINISHED TYPE A LINE 'XXX'
 ?NO -- THE ANSWER IS  7.623 HG.
 ?XXX
AT THIS LOCATION, DO YOU WANT TO ADD:  (1)  LABEL, (2)  TEXT,
```

Computer Output: Right or wrong answer message added separately from question. (Note: the preceding segment must be either an Answer segment or a Right/Wrong Answer Message - opposite that which is being input.)

```
AT THIS LOCATION, DO YOU WANT TO ADD  (1) LABEL, (2) TEXT,
   (3) QUESTION, (4) REPLACEMENT QUESTION, (5) BRANCH,
   (6) RIGHT/WRONG ANSWER MESSAGE, (7) CHAIN, OR (8) NOTHING.
?6
(1)  RIGHT ANSWER MESSAGE, OR (2) WRONG ANSWER MESSAGE  ?1
TYPE IN MESSAGE
WHEN FINISHED TYPE A LINE 'XXX'
?RIGHT.
?XXX
```

Computer Output: How it shows up when the teacher lists the unit

```
19 )  RIGHT ANSWER MESSAGE

 RIGHT.
```

2.7 Labels

Labels are just markers in the unit to make branching easier to use. They are needed only if they are referred to in a branch statement.

Computer Output: Inputting a label

```
AT THIS LOCATION, DO YOU WANT TO ADD:  (1) LABEL, (2) TEXT,
   (3) QUESTION, (4) REPLACEMENT QUESTION, (5) BRANCH,
   (6) RIGHT/WRONG ANSWER MESSAGE, (7) CHAIN, OR (8) NOTHING.
 ?1
TYPE IN LABEL NAME
 ?END
AT THIS LOCATION, DO YOU WANT TO ADD:  (1) LABEL, (2) TEXT,
```

Computer Output: How it shows up when the teacher lists the unit.

```
15 ) LABEL:  END
```

2.8 Branching - Four Types

Branching is used for skipping and repeating portions of a unit (as opposed to sequential execution of segments). A branch simply allows one to jump to a different spot in the unit if some condition is true. This spot is designated by a label. There are four types of branches you can use, but the first two should be skipped by beginners.

(1) Branch if taken -- this will cause a jump to another part of the unit if a particular question has been taken. (The question may also be a replacement question,) Two labels are necessary for this branch: a label immediately preceding the question (or replacement) you want checked, and a label before the segment to which to jump if the condition is met. If the condition is not met, the segment after the branch instruction is executed next.

(2) Branch if correct -- this will cause a jump if a particular question was correct. The same two labels are necessary as for the Branch if taken, except the question label may not precede a replacement question. When checking if a question is correct, the question and all replacements are checked. If any are correct the branch is performed.

(3) Branch if # correct -- this branch causes a jump if the number of questions correct prior to execution of the branch instruction is at least the minimum specified. For example, if a minimum of 5 is specified, the student must have gotten at least 5 questions (or their replacements) correct before the branch is executed. Also counted are any questions credited up to that point. (If it is not his first time through and he has skipped questions because they were previously correct, they are counted correct in the total. Questions that were previously correct, but occur later in the unit, are not counted). It is necessary to specify the minimum number correct and a label to which to branch.

(4) Branch -- this branch causes a jump unconditionally. No condition is checked. Only a label is specified. The necessity for this type of branch arises when one wants a certain portion of the unit to be run for some students and another portion for other students.

Computer Output: How branches look in the unit listing.

```
21 ) BRANCH TO END IF QUESTION Q1 WAS TAKEN

22 ) BRANCH TO END IF QUESTION Q1 WAS CORRECT

23 ) BRANCH TO END IF AT LEAST 5 CORRECT

24 ) BRANCH TO END
```

2.9 Chaining (beginners should skip this section)

Chaining allows one to jump out of the unit to either another unit or a BASIC program (e.g. a simulation lesson). When choosing the chain command, one must pick whether he is chaining to a unit or program, then specify the program name or unit name.

When chaining to a unit, data kept for the unit that was being used is stored, then CAISP starts over again with the new unit as if someone had just signed in. (The sign-on procedure is done automatically.)

When chaining to a BASIC program, data kept for the unit is stored and the new program takes over. The student is no longer in the CAISP program.

Note: By using the BASIC language "CHAIN" command one can chain back to CAISP from another BASIC program. The student will have to sign in again, however. When re-entering the CAISP unit it is also possible to use BRANCH IF TAKEN as the first segment and branch the student to the point in the unit where he left off.

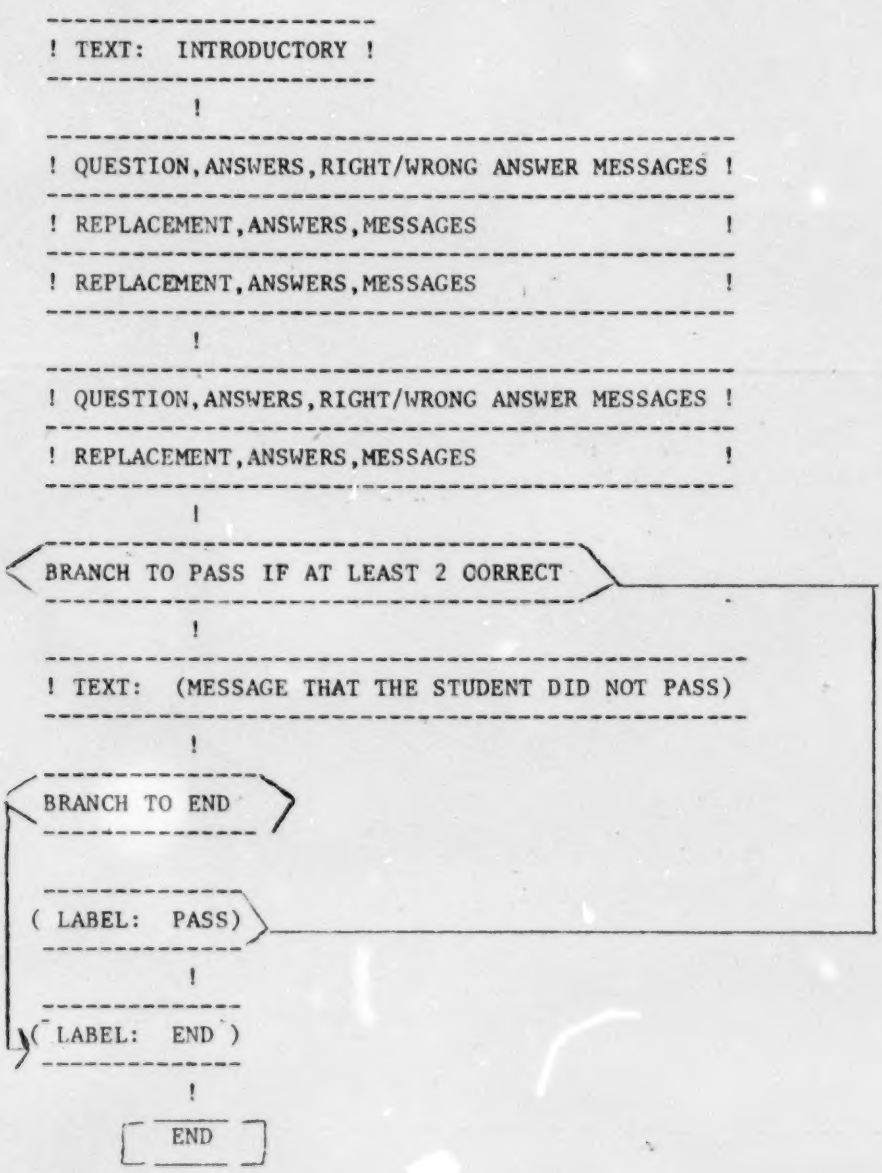
Computer Output: Inputting a chain.

```
AT THIS LOCATION, DO YOU WANT TO ADD:  (1) LABEL, (2) TEXT,
   (3) QUESTION, (4) REPLACEMENT QUESTION, (5) BRANCH,
   (6) RIGHT/WRONG ANSWER MESSAGE, (7) CHAIN, OR (8) NOTHING.
 ?7
CHAIN (1) TO BASIC PROGRAM, OR (2) TO ANOTHER UNIT     ?1
PROGRAM NAME  ?POLUT

AT THIS LOCATION, DO YOU WANT TO ADD:  (1) LABEL, (2) TEXT,
   (3) QUESTION, (4) REPLACEMENT QUESTION, (5) BRANCH,
   (6) RIGHT/WRONG ANSWER MESSAGE, (7) CHAIN, OR (8) NOTHING.
 ?7
CHAIN (1) TO BASIC PROGRAM, OR (2) TO ANOTHER UNIT     ?2
UNIT NAME  ?LENGTH
```

2.10 Writing a Unit - Flowcharting

When writing a unit, the task will be simplified if one draws a flow chart first. This will help with the placement of branch commands and help follow the student paths. The following sample flowchart is an example of the easiest type of unit, but also the most common structure that units will assume. After one uses CAISP the other branches and chaining will be used occasionally, but the following structure will still hold in general.



2.11 Writing a Unit - The Teacher/Unit Program

To write a unit you must first have the person in charge of managing CAISP initialize the unit name for you, (See Section 2.17). Initializing consists only of telling CAISP that a unit by the chosen name will exist, and putting an END segment in that unit. After this is done, you may sign in on the teacher/unit program with your course name and course password. (To initialize a course, also see your director.) The program will give you a list of units for your course and ask you to choose one. It will then give you the choice of adding segments, altering segments, deleting segments, printing the unit, or exiting. The instructions are self explanatory for each choice. If you choose to add, you will have to give the number of the segment before which you want to insert the new segments. The segment numbers are not actually part of the unit; they are just used as references when writing and editing. If you are just beginning you would choose 1, since, when initialized, 1 is the end segment. The segment numbers change when you add and delete (shifting up and back accordingly), so when editing make sure you have an updated printout of the unit. When choosing to add, you will get a list of choices -- you just pick the number of the type of segment you want. You are able to add several segments in one location of a unit without having to choose to add for each one.

Computer Output: Signing in the TEACHER/UNIT program, beginning to write a unit

```
COURSE NAME ?METRIC
PASSWORD ?CONVERT
WHICH UNIT?    CHOICES:
MSAMP          LENGTH          IND          ARITH          INTR
VOLUME         TEMPER          WEIGHT       APPLIC          ?MSAMP
CHOICES:  (1) ADD SEGMENT(S), (2) ALTER AN EXISTING SEGMENT,
   (3) DELETE A SEGMENT, (4) PRINT, (5) EXIT     ?1
BEFORE WHICH SEGMENT DO YOU WISH TO ADD?
   (TYPE '0' TO NOT ADD)  ?1
AT THIS LOCATION, DO YOU WANT TO ADD:  (1) LABEL, (2) TEXT,
   (3) QUESTION, (4) REPLACEMENT QUESTION, (5) BRANCH,
   (6) RIGHT/WRONG ANSWER MESSAGE, (7) CHAIN, OR (8) NOTHING.
?2
TYPE IN TEXT
```

When editing a unit, you will want a listing of the unit before you begin. Instead of choosing to add, you would choose to print.

Computer Output: Printing a unit

```
CHOICES:  (1) ADD SEGMENT(S), (2) ALTER AN EXISTING SEGMENT,
   (3) DELETE A SEGMENT, (4) PRINT, (5) EXIT     ?4

(1) ENTIRE UNIT, OR (2) PART OF UNIT  ?2
FROM SEGMENT # ?15
TO SEGMENT # ?30
```

In this example, the teacher chose only to print segments 15-30. Choice (1), ENTIRE UNIT, would cause the whole unit to be listed.

Occasionally a typing error will be discovered after a unit is written, or the teacher will decide to change some wording or allow more acceptable answers. This type of correction can be made using the alter option.

Computer Output: Altering a segment

```
CHOICES:  (1) ADD SEGMENT(S), (2) ALTER AN EXISTING SEGMENT,
   (3) DELETE A SEGMENT, (4) PRINT, (5) EXIT     ?2
WHICH SEGMENT DO YOU WANT TO CHANGE ('0' FOR NONE)    ?10

 1  NO -- THE ANSWER IS 15 LITERS.  YOU GET THIS BY FIRST CONVERTING
 2  METERS TO CENTIMETERS (SINCE YOU CAN'T MULTIPLY DIFFERENT UNITS)
 3  THEN MULTIPLYING WIDTH X LENGTH X HEIGHT.  100 CM X 10 CM X 15 CM
 4  =15000 CC -- AND SINCE 1000 CC'S MAKE 1 LITER THE ANSWER IS 15 L.

(1) ADD LINE, (2) REPLACE LINE, (3) DELETE LINE,
(4) PRINT THE SEGMENT, (5) NONE   ?2

WHICH LINE ?2
NEW LINE
 ?METERS TO CENTIMETERS (SINCE YOU CAN'T MULTIPLY DIFFERENT UNITS).

(1) ADD LINE, (2) REPLACE LINE, (3) DELETE LINE,
(4) PRINT THE SEGMENT, (5) NONE   ?1
AFTER WHICH LINE ('0' FOR BEGINNING)  ?4
NEW LINE
 ?--- REMEMBER:  THE UNITS HAVE TO BE THE SAME!   ---

(1) ADD LINE, (2) REPLACE LINE, (3) DELETE LINE,
(4) PRINT THE SEGMENT, (5) NONE   ?4

 1  NO -- THE ANSWER IS 15 LITERS.  YOU GET THIS BY FIRST CONVERTING
 2  METERS TO CENTIMETERS (SINCE YOU CAN'T MULTIPLY DIFFERENT UNITS).
 3  THEN YOU MULTIPLY WIDTH X LENGTH X HEIGHT -- 100 CM X 10 CM X 15 CM
 4  =15000 CC -- AND SINCE 1000 CC'S MAKE 1 LITER THE ANSWER IS 15 L.
 5  --- REMEMBER:  THE UNITS HAVE TO BE THE SAME!   ---

(1) ADD LINE, (2) REPLACE LINE, (3) DELETE LINE,
(4) PRINT THE SEGMENT, (5) NONE   ?5
```

Computer Output: Deleting a Segment

```
CHOICES:  (1) ADD SEGMENT(S), (2) ALTER AN EXISTING SEGMENT,
   (3) DELETE A SEGMENT, (4) PRINT, (5) EXIT     ?3
WHICH SEGMENT DO YOU WANT DELETED ('0' FOR NONE)  ?15
DELETED
CHOICES:  (1) ADD SEGMENT(S), (2) ALTER AN EXISTING SEGMENT, etc.
```

2.12 Writing a Unit - Restrictions

There are several restrictions to CAISP due to computer capabilities and the programming of CAISP.

(1) No commas are allowed in any text. Just forget that commas exist, because there is no way you can use them. This is a problem with the way the machine works, but a future version of CAISP may allow a way around this.

(2) No double quotes. Use single quotes (apostrophe's) instead.

(3) No line may begin with an asterisk (*). When your segments are coded by CAISP, they are set apart from text, etc. with each code beginning with an asterisk.

(4) You must always have a character in the first column of any line. The computer ignores leading blanks. To indent, the easiest way is to have a leading period in each line.

(5) You are limited to a maximum of 24 questions per unit (this is questions and replacements combined). If more questions are needed, experienced users might consider chaining units, but remember that the record totals don't carry over.

2.13 Sample Unit

For a listing of a sample unit, see Appendix A. Sample student runs of this unit are in Appendix B.

2.14 The Student Program

The Student Program executes the commands in the unit specified when it is run. To use the Student Program one must have a student name, a course name in which the student is listed, student password for that student, and the unit name desired. After typing in this data, one is told that he may stop the unit by typing 'STOP' anytime the computer says 'PRESS RETURN ?', which is before each question is given. From then on the student program follows instructions from the unit.

For sample student runs of a unit, see Appendix B.

2.15 The Records Program

The Records Program gives the teacher the choice of printing student records, adding and deleting students, setting the no record option (which is discussed in section 2.16) seeing records for a unit, and deleting certain unit records.

A printout of the student records can be either for an individual student or for the whole course. The computer will list the students and each unit each student has used, with the most recent unit entered being the last in the list, etc. The computer lists the 24 possible questions by column, and under each, for each unit, lists either 'C', 'X', '*C', or '*X'. 'C' means that question was correct, 'X' means it was incorrect, and '*' before either means that the student has taken that question more than once. The teacher also has the option of getting a list of the student names only.

Computer Output: Records program choices

```
COURSE ?METRIC
PASSWORD ?CONVERT

PRESS  RETURN  ?
CHOICES:  (1)  PRINT STUDENT RECORD(S),
          (2)  ADD/DELETE STUDENTS,
          (3)  SET NO RECORD OPTION,
          (4)  SEE UNIT RECORD
          (5)  DELETE CERTAIN RECORDS,
          (6)  EXIT.
```

Computer Output: Two students' records

```
A

UNIT    1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
ARITH   X   C   C   C
MSAMP    NO RECORDS UNIT

B

UNIT    1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
ARITH   X C X C*C X*X X
MSAMP    NO RECORDS UNIT
```

The add and delete options allow new students to be added to the course or old ones to be dropped, along with their records.

Computer Output: Adding and deleting students

```
(1) ADD, OR (2) DELETE          ?1
STUDENT'S NAME  ?R
STUDENT'S PASSWORD  ?R
ANOTHER STUDENT  ('YES' OR 'NO')     ?N

(1) ADD, OR (2) DELETE     ?2
STUDENT'S NAME  ?R
```

In setting the no record option, the teacher is allowed to set it for one unit for one student, or one unit for all students. This option is explained in the next section.

Computer Output: Setting the No Record Option

```
THE NO RECORD OPTION ALLOWS THE STUDENT FOR WHICH IT IS
SET TO GO THROUGH THE UNIT SPECIFIED WITHOUT RECORDS BEING
KEPT.
WHAT IS THE NAME OF THE UNIT  ?MSAMP
(1) ALL STUDENTS FOR THIS UNIT, OR (2) SELECTED STUDENTS FOR
THIS UNIT   ?2
STUDENT'S NAME  ?R
ANOTHER STUDENT ('YES' OR 'NO')  ?N
```

The teacher may see a unit's record by specifying the unit's name. The program then tells how many students have used that unit, how many of them have the no record option, and then for each question gives a summary of the number of occurrences of C's, X's, *C's and *X's.

Computer Output: Unit Record

```
WHICH UNIT  ?ARITH
WAIT.  - -  COMPUTING- - -

UNIT:  ARITH

STUDENTS ENTERED:  23
NON RECORD STUDENTS:  4
```

QUESTION	C	*C	X	*X	QUESTION	C	*C	X	*X
1	10	2	6	1	13	0	0	0	0
2	6	1	2	0	14	0	0	0	0
3	16	0	3	0	15	0	0	0	0
4	3	0	0	0	16	0	0	0	0
5	5	1	11	0	17	0	0	0	0
6	11	0	1	0	18	0	0	0	0
7	17	0	1	1	19	0	0	0	0
8	1	0	1	0	20	0	0	0	0
9	0	0	0	0	21	0	0	0	0
10	0	0	0	0	22	0	0	0	0
11	0	0	0	0	23	0	0	0	0
12	0	0	0	0	24	0	0	0	0

The 'DELETE CERTAIN RECORDS' choice allows the teacher to delete old records from the computer so that the record list doesn't become cumbersome to output. He may delete one unit's record from an individual student or from all students.

Computer Output: Deleting Records

```
DELETE A PARTICULAR UNIT FOR (1) SELECTED STUDENTS,
(2) ALL STUDENTS, OR (3) NOT DELETE   ?2
WHICH UNIT ?MSAMP
```

2.16 No Record Units for Specified Students

The no record option for a student for a particular unit allows that student to use the unit without records being kept permanently. This is useful for allowing students to review or for units in which you want to allow students to see questions more than once, even when they were correct the first time. (Drill and practice units can be written this way).

2.17 The Director's Program

The Director's Program is for the use of one or a few people who are generally in charge of managing the computer. (ISEAC Number 10 describes the role of such a person.) It is necessary for this person to be accessible to users of CAISP, because he is the one who is able to create and initialize courses and units for CAISP.

Through the Director's Program, the Director is able to: (1) create and initialize a new course name for CAISP, along with its teacher password, (2) create and initialize a new unit name for any existing course, (3) allow an existing unit to be put on an existing course's unit list, (4) take a unit off a course list, (5) see a list of courses on CAISP, (6) see the password and unit list for any course, and (7) delete a course from CAISP. All these functions are left to the Director because they either entail editing the master file for CAISP, cause data files to be created or deleted, or give information needed only by the Director.

III. What can be done with CAISP

Although CAISP was originally intended for pre-test and post-test type of material to be used with individualized instruction, it also lends itself to other CAI uses. Furthermore, due to the programmed structure of the units, some of the power of CAISP is not immediately visible.

3.1 Using CAISP for student paced quiz material

If CAISP is used in a course being taught by individualized study, most units will be similar in structure to the one flow charted in this paper. The introductory text will tell what the unit covers, give the requirements for passing, and give any special instructions concerning the questions.

The "pass" text at the end of the quiz will give an assignment and the next unit, while the "not pass" text will have a remedial assignment and instructions to return to the unit. Wrong answer messages may also contain remedial assignments, with the wrong answer message for a replacement being a more in-depth remedial assignment or instructions to ask the teacher to explain. To get this message, the student will have had to miss two questions on that concept.

The length of the quiz, amount of text, and type of questions will have to vary with the amount of computer time available. Even if there is a terminal available in the classroom, during a class of 50 minutes barely half of a typical high school class would get to use it. It is essential that this be kept in mind when planning units and implementing the program.

3.2 Drill and Practice on CAISP

Drill and practice lessons can be written with CAISP by using the no record option for that unit and leaving out replacement questions. This will allow any student to go through the unit as many times as he wishes and still be given every question. Remedial explanations can be given through wrong answer messages, and the branching options may still be used.

3.3 Evaluation of Other Programs

By use of chaining, CAISP can be used to introduce another lesson program or a simulation and chain to that program. Then by chaining back to CAISP or signing back in, the student-user can answer questions about the program used, with the answers being stored.

The student should either be instructed to sign back into CAISP when through with the program, or the programmer could put the BASIC statement "CHAIN CAISP" at the end of the program. However, the student will have to repeat the CAISP sign-on procedure either way.

When going into the unit the second time (after seeing the other program) the unit author must make a provision for the student to skip the chain. This can either be done with a question and branch if correct, or a branch if taken as the first segment of the unit, with the question checked being one the student had to take before chaining.

3.4 Information and Lesson Dissemination

Because of the easy nature of putting material into CAISP, it may be useful to store text material, lessons, or bibliographies on CAISP so that users of the Student Program can get information output to them that they could take away. These would be on no record units, with questions used only to facilitate branching.

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ISAAC APPENDIX A SAMPLE UNIT

```
COURSE NAME ?METRIC
PASSWORD ?CONVERT
WHICH UNIT?    CHOICES:
MSAMP          LENGTH          IND             ARITH          INTR
VOLUME         TEMPER          WEIGHT          APPLIC         ?ARITH
CHOICES: (1) ADD SEGMENT(S), (2) ALTER AN EXISTING SEGMENT,
   (3) DELETE A SEGMENT, (4) PRINT, (5) EXIT    ?4


(1) ENTIRE UNIT, OR (2) PART OF UNIT   ?1


 1 ) TEXT

   YOU HAVE JUST BEGUN A SERIES OF LESSONS CONCERNING THE METRIC
   SYSTEM.  ALTHOUGH THE METRIC SYSTEM MAY SEEM DIFFICULT AT FIRST
   BECAUSE IT IS UNFAMILIAR IT IS ACTUALLY SIMPLER TO USE THAN OUR
   PRESENT SYSTEM.  WITHIN THE NEXT FEW YEARS THE UNITED STATES
   WILL BE ADOPTING THE METRIC SYSTEM TO REPLACE OUR UNITS OF
   MEASUREMENT KNOWN AS THE ENGLISH SYSTEM, AND DURING THE
   PERIOD OF CHANGEOVER AMERICANS WILL HAVE TO BE FAMILIAR
   WITH BOTH SYSTEMS.  IT IS THE GOAL OF THESE LESSONS TO HELP
   YOU DO SO.

 2 ) TEXT

   ONCE YOU ARE FAMILIAR WITH THE METRIC SYSTEM IT SHOULD BE
   POSSIBLE FOR YOU TO MAKE GOOD ESTIMATES AND/OR CONVERSIONS WITH
   THE ENGLISH SYSTEM.  TO BE ACCURATE HOWEVER IT WILL BE NECESSARY
   TO KNOW SOME OF THE CONVERSION FACTORS AND TO BE ABLE TO DO SOME
   SIMPLE ARITHMETIC.  THE FOLLOWING IS A SHORT ARITHMETIC QUIZ TO
   TEST YOURSELF BEFORE YOU GO ON.  YOU MAY WANT TO USE PAPER AND
   PENCIL OR EVEN A CALCULATOR IF AVAILABLE.  (SORRY YOU CANNOT DO
   CALCULATIONS ON THIS COMPUTER TERMINAL.)

 3 ) TEXT

   TO PASS THIS QUIZ YOU WILL HAVE TO GET AT LEAST 3 OF THE 4
   PROBLEMS CORRECT.

 4 ) QUESTION                    **** QUESTION  1  ****

   I        9.6
   I     +82.0
   I      ----

 5 ) ACCEPTABLE ANSWERS:
   91.6

 6 ) RIGHT ANSWER MESSAGE:

   RIGHT.

 7 ) WRONG ANSWER MESSAGE:

   NO -- THE ANSWER IS 91.6

 8 ) REPLACEMENT QUESTION        **** QUESTION  2  ****

   I         54
   I        -32
   I         --

 9 ) ACCEPTABLE ANSWERS:
   22
   22.
   22.0

10 ) RIGHT ANSWER MESSAGE:

   RIGHT.

11 ) WRONG ANSWER MESSAGE:

   NO -- THE ANSWER IS 22.  YOU NEED TO WORK ON YOUR ADDITION AND
   SUBTRACTION.

12 ) QUESTION                   **** QUESTION  3  ****

   I         84
   I        -26
   I         --

13 ) ACCEPTABLE ANSWERS:
   58
   58.
   58.0

14 ) RIGHT ANSWER MESSAGE:

   GOOD.

15 ) WRONG ANSWER MESSAGE:

   NO -- THE ANSWER IS 58.

16 ) REPLACEMENT QUESTION       **** QUESTION  4  ****

   I        43.2
   I       -16.9
   I        ----

17 ) ACCEPTABLE ANSWERS:
   26.3

18 ) RIGHT ANSWER MESSAGE:

   GOOD.

19 ) WRONG ANSWER MESSAGE:

   NO -- THE ANSWER IS 26.3.  WORK ON YOUR SUBTRACTION!

20 ) QUESTION                   **** QUESTION  5  ****

   I         21
   I        X 5
   I         --

21 ) ACCEPTABLE ANSWERS:
   105
   105.
   105.0

22 ) RIGHT ANSWER MESSAGE:

   RIGHT.

23 ) WRONG ANSWER MESSAGE:

   NO...THE ANSWER IS 105.

24 ) REPLACEMENT QUESTION       **** QUESTION  6  ****

   I        30.1
   I       X11.2
   I        ----

25 ) ACCEPTABLE ANSWERS:
   337.12

26 ) RIGHT ANSWER MESSAGE:

   RIGHT.

27 ) WRONG ANSWER MESSAGE:

   NO.  THE ANSWER SHOULD BE 337.12 -- PRACTICE MULTIPLICATION.

28 ) QUESTION                   **** QUESTION  7  ****

   I         --
   I       14/56

29 ) ACCEPTABLE ANSWERS:
   4
   4.
   4.0

30 ) RIGHT ANSWER MESSAGE:

   OKAY!

31 ) WRONG ANSWER MESSAGE:

   NOPE.  YOU SHOULD HAVE GOTTEN 4.

32 ) REPLACEMENT QUESTION       **** QUESTION  8  ****

   I         ----
   I     11.3/144.64

33 ) ACCEPTABLE ANSWERS:
   12.8

34 ) RIGHT ANSWER MESSAGE:

   OKAY!

35 ) WRONG ANSWER MESSAGE:

   NOPE...THE ANSWER IS 12.8.  WORK ON YOUR DIVISION.

36 ) BRANCH TO PASS IF AT LEAST 3 CORRECT

37 ) TEXT

   YOU HAVE MISSED AT LEAST 2 OF THE PROBLEMS.  PLEASE CONTACT YOUR
   INSTRUCTOR FOR A SET OF PRACTICE ARITHMETIC PROBLEMS AND
   AFTER YOU HAVE FINISHED WORKING THEM COME BACK AND TRY THIS
   QUIZ AGAIN.

38 ) BRANCH TO END

39 ) LABEL: PASS

40 ) TEXT

   GOOD.  YOU HAVE GOTTEN AT LEAST 3 OF THE PROBLEMS
   CORRECT AND ARE NOW READY TO GO ON TO THE NEXT UNIT --
   AN INTRODUCTION TO THE METRIC SYSTEM -- TITLED INTR.

41 ) LABEL: END

42 ) END
```

ISRAC II APPENDIX B RUNS OF SAMPLE UNIT
FIRST RUN FOR STUDENTS 'M' AND 'N'

```
NAME ?M
COURSE ?METRIC
PASSWORD ?M
UNIT ?ARITH

IF YOU WANT TO LEAVE THE UNIT, TYPE 'STOP' WHEN IT
SAYS 'PRESS -RETURN-?'

YOU HAVE JUST BEGUN A SERIES OF LESSONS CONCERNING THE METRIC
SYSTEM.  ALTHOUGH THE METRIC SYSTEM MAY SEEM DIFFICULT AT FIRST
BECAUSE IT IS UNFAMILIAR IT IS ACTUALLY SIMPLER TO USE THAN OUR
PRESENT SYSTEM.  WITHIN THE NEXT FEW YEARS THE UNITED STATES
WILL BE ADOPTING THE METRIC SYSTEM TO REPLACE OUR UNITS OF
MEASUREMENT KNOWN AS THE ENGLISH SYSTEM; AND DURING THE
PERIOD OF CHANGEOVER AMERICANS WILL HAVE TO BE FAMILIAR
WITH BOTH SYSTEMS.  IT IS THE GOAL OF THESE LESSONS TO HELP
YOU DO SO.

ONCE YOU ARE FAMILIAR WITH THE METRIC SYSTEM IT SHOULD BE
POSSIBLE FOR YOU TO MAKE GOOD ESTIMATES AND/OR CONVERSIONS WITH
THE ENGLISH SYSTEM.  TO BE ACCURATE HOWEVER IT WILL BE NECESSARY
TO KNOW SOME OF THE CONVERSION FACTORS AND TO BE ABLE TO DO SOME
SIMPLE ARITHMETIC.  THE FOLLOWING IS A SHORT ARITHMETIC QUIZ TO
TEST YOURSELF BEFORE YOU GO ON.  YOU MAY WANT TO USE PAPER AND
PENCIL OR EVEN A CALCULATOR IF AVAILABLE.  (SORRY YOU CANNOT DO
CALCULATIONS ON THIS COMPUTER TERMINAL.)

TO PASS THIS QUIZ YOU WILL HAVE TO GET AT LEAST 3 OF THE 4
PROBLEMS CORRECT.

PRESS -RETURN-   ?

I        9.6
I      +82.0
I       ----

 ?91.6

RIGHT.

PRESS -RETURN-   ?

I          84
I         -26
I         ---

 ?58

GOOD

PRESS -RETURN-   ?

I          21
I         X 5
I          --

 ?105

RIGHT.

PRESS -RETURN-   ?

I          --
I       14/56

 ?4

OKAY!

GOOD.  YOU HAVE GOTTEN AT LEAST 3 OF THE PROBLEMS
CORRECT AND ARE NOW READY TO GO ON TO THE NEXT UNIT --
AN INTRODUCTION TO THE METRIC SYSTEM -- TITLED INTR.
```

```
NAME ?N
COURSE ?METRIC
PASSWORD ?N
UNIT ?ARITH

IF YOU WANT TO LEAVE THE UNIT, TYPE 'STOP' WHEN IT
SAYS 'PRESS -RETURN-?'

YOU HAVE JUST BEGUN A SERIES OF LESSONS CONCERNING THE METRIC
SYSTEM.  ALTHOUGH THE METRIC SYSTEM MAY SEEM DIFFICULT AT FIRST
BECAUSE IT IS UNFAMILIAR IT IS ACTUALLY SIMPLER TO USE THAN OUR
PRESENT SYSTEM.  WITHIN THE NEXT FEW YEARS THE UNITED STATES
WILL BE ADOPTING THE METRIC SYSTEM TO REPLACE OUR UNITS OF
MEASUREMENT KNOWN AS THE ENGLISH SYSTEM; AND DURING THE
PERIOD OF CHANGEOVER AMERICANS WILL HAVE TO BE FAMILIAR
WITH BOTH SYSTEMS.  IT IS THE GOAL OF THESE LESSONS TO HELP
YOU DO SO.

ONCE YOU ARE FAMILIAR WITH THE METRIC SYSTEM IT SHOULD BE
POSSIBLE FOR YOU TO MAKE GOOD ESTIMATES AND/OR CONVERSIONS WITH
THE ENGLISH SYSTEM.  TO BE ACCURATE HOWEVER IT WILL BE NECESSARY
TO KNOW SOME OF THE CONVERSION FACTORS AND TO BE ABLE TO DO SOME
SIMPLE ARITHMETIC.  THE FOLLOWING IS A SHORT ARITHMETIC QUIZ TO
TEST YOURSELF BEFORE YOU GO ON.  YOU MAY WANT TO USE PAPER AND
PENCIL OR EVEN A CALCULATOR IF AVAILABLE.  (SORRY YOU CANNOT DO
CALCULATIONS ON THIS COMPUTER TERMINAL.)

TO PASS THIS QUIZ YOU WILL HAVE TO GET AT LEAST 3 OF THE 4
PROBLEMS CORRECT.

PRESS -RETURN-   ?

I        9.6
I      +82.0
I       ----

 ?101.6

NO -- THE ANSWER IS 91.6

PRESS -RETURN-   ?

I          84
I         -26
I         ---

 ?38

NO -- THE ANSWER IS 58.

PRESS -RETURN-   ?

I          21
I         X 5
I          --

 ?115

NO...THE ANSWER IS 105.

PRESS -RETURN-   ?

I          --
I       14/56

 ?5

NOPE.  YOU SHOULD HAVE GOTTEN 4.

YOU HAVE MISSED AT LEAST 2 OF THE PROBLEMS.  PLEASE CONTACT YOUR
INSTRUCTOR FOR A SET OF PRACTICE ARITHMETIC PROBLEMS AND
AFTER YOU HAVE FINISHED WORKING THEM COME BACK AND TRY THIS
QUIZ AGAIN.
```

```
NAME ?N
COURSE ?METRIC
PASSWORD ?N
UNIT ?ARITH

IF YOU WANT TO LEAVE THE UNIT, TYPE 'STOP' WHEN IT
SAYS 'PRESS -RETURN-?'

YOU HAVE JUST BEGUN A SERIES OF LESSONS CONCERNING THE METRIC
SYSTEM.  ALTHOUGH THE METRIC SYSTEM MAY SEEM DIFFICULT AT FIRST
BECAUSE IT IS UNFAMILIAR IT IS ACTUALLY SIMPLER TO USE THAN OUR
PRESENT SYSTEM.  WITHIN THE NEXT FEW YEARS THE UNITED STATES
WILL BE ADOPTING THE METRIC SYSTEM TO REPLACE OUR UNITS OF
MEASUREMENT KNOWN AS THE ENGLISH SYSTEM; AND DURING THE
PERIOD OF CHANGEOVER AMERICANS WILL HAVE TO BE FAMILIAR
WITH BOTH SYSTEMS.  IT IS THE GOAL OF THESE LESSONS TO HELP
YOU DO SO.

ONCE YOU ARE FAMILIAR WITH THE METRIC SYSTEM IT SHOULD BE
POSSIBLE FOR YOU TO MAKE GOOD ESTIMATES AND/OR CONVERSIONS WITH
THE ENGLISH SYSTEM.  TO BE ACCURATE HOWEVER IT WILL BE NECESSARY
TO KNOW SOME OF THE CONVERSION FACTORS AND TO BE ABLE TO DO SOME
SIMPLE ARITHMETIC.  THE FOLLOWING IS A SHORT ARITHMETIC QUIZ TO
TEST YOURSELF BEFORE YOU GO ON.  YOU MAY WANT TO USE PAPER AND
PENCIL OR EVEN A CALCULATOR IF AVAILABLE.  (SORRY YOU CANNOT DO
CALCULATIONS ON THIS COMPUTER TERMINAL.)

TO PASS THIS QUIZ YOU WILL HAVE TO GET AT LEAST 3 OF THE 4
PROBLEMS CORRECT.

PRESS -RETURN-  ?

I        54
I        32
I        --

 ?22

RIGHT.

PRESS -RETURN-

I        47.2
I       -18.5
I       -----

 ?28.7

GOOD.

PRESS -RETURN-  ?

I        30.1
I       *11.2
I       -----

 ?311.1

NO.  THE ANSWER SHOULD BE 337.12  --- PRACTICE MULTIPLICATION.

PRESS -RETURN-

I
I    12.3+24.4

 ?13.1

NOPE...THE ANSWER IS 12.8.  WORK ON YOUR DIVISION.

YOU HAVE MISSED AT LEAST 2 OF THE PROBLEMS.  PLEASE CONTACT YOUR
INSTRUCTOR FOR A SET OF PRACTICE ARITHMETIC PROBLEMS AND
AFTER YOU HAVE FINISHED WORKING THEM COME BACK AND TRY THIS
QUIZ AGAIN.
```

```
NAME ?N
COURSE ?METRIC
PASSWORD ?N
UNIT ?ARITH

IF YOU WANT TO LEAVE THE UNIT, TYPE 'STOP' WHEN IT
SAYS 'PRESS -RETURN-?'

YOU HAVE JUST BEGUN A SERIES OF LESSONS CONCERNING THE METRIC
SYSTEM.  ALTHOUGH THE METRIC SYSTEM MAY SEEM DIFFICULT AT FIRST
BECAUSE IT IS UNFAMILIAR IT IS ACTUALLY SIMPLER TO USE THAN OUR
PRESENT SYSTEM.  WITHIN THE NEXT FEW YEARS THE UNITED STATES
WILL BE ADOPTING THE METRIC SYSTEM TO REPLACE OUR UNITS OF
MEASUREMENT KNOWN AS THE ENGLISH SYSTEM; AND DURING THE
PERIOD OF CHANGEOVER AMERICANS WILL HAVE TO BE FAMILIAR
WITH BOTH SYSTEMS.  IT IS THE GOAL OF THESE LESSONS TO HELP
YOU DO SO.

ONCE YOU ARE FAMILIAR WITH THE METRIC SYSTEM IT SHOULD BE
POSSIBLE FOR YOU TO MAKE GOOD ESTIMATES AND/OR CONVERSIONS WITH
THE ENGLISH SYSTEM.  TO BE ACCURATE HOWEVER IT WILL BE NECESSARY
TO KNOW SOME OF THE CONVERSION FACTORS AND TO BE ABLE TO DO SOME
SIMPLE ARITHMETIC.  THE FOLLOWING IS A SHORT ARITHMETIC QUIZ TO
TEST YOURSELF BEFORE YOU GO ON.  YOU MAY WANT TO USE PAPER AND
PENCIL OR EVEN A CALCULATOR IF AVAILABLE.  (SORRY YOU CANNOT DO
CALCULATIONS ON THIS COMPUTER TERMINAL.)

TO PASS THIS QUIZ YOU WILL HAVE TO GET AT LEAST 3 OF THE 4
PROBLEMS CORRECT.

I        21
I       X 5
I       ---

 ?105

RIGHT.

I       --
I       14/56

 ?4.5

NOPE.  YOU SHOULD HAVE GOTTEN 4.

GOOD.  YOU HAVE GOTTEN AT LEAST 3 OF THE PROBLEMS
CORRECT AND ARE NOW READY TO GO ON TO THE NEXT UNIT --
AN INTRODUCTION TO THE METRIC SYSTEM -- TITLED INTR.
```